TUMORS OF THE BREAST IN CHILDHOOD.

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THE recent occurrence of two cases of tumor of the female breast in children in our own practice has induced us to make some further study on the general subject of tumors of the breast in childhood. A search of the literature has shown an apparent absence of systematic papers on the subject and we have thought it worth while to collect and analyze the scattered cases of these unusual affections. To the paper of Malapert and Morichau-Beauchant[2] we are indebted for the cases of angioma of the breast included in our own series. The remaining cases have been collected from the literature at large, mainly from case-reports in the journals. In addition to the complete histories of our own cases, we have made brief abstracts of all the other cases which we could find and analyzed them with reference to the pathology, symptomatology and treatment.

A large majority of tumors of the breast in childhood are benign in character. They may be conveniently divided into benign tumors of vascular origin and benign tumors other than those of vascular origin.

Vascular tumors of the breast exist as cutaneous, subcutaneous or intraglandular formations. This subject has been thoroughly investigated by Malapert and Morichau-Beauchant[2] from whose article on the subject most of the data here collected has been obtained. They have collected and analyzed all the recorded cases of angioma of the breast; among these were six, including one of their own, in children under sixteen years of age. The first class are unimportant, have the characteristics of nævi occurring elsewhere, and are apt to be seen on or near the nipple. Bryant[3] reports a case the size of a shilling, which was destroyed by the galvanic cautery.

In the subcutaneous variety the cellular tissues are invaded by small tumors which may cause atrophy of the glandular structures by pressure. They are small, nodular, circumscribed and the overlying skin is healthy. The intramammary forms of glandular tumors are true angiomata of the breast although it is difficult in certain cases to recognize the precise origin of the tumor. If situated near the nipple the glandular tissues may undergo atrophy but the ducts persist because of their greater resisting power. The affection may be diffuse as in Bajardi's[1] case, or less often, encapsulated. Both sexes are affected with equal frequency, the growths occurring either at birth or in the earliest months of life, and they may exist for years if not treated. The symptoms vary; at times an erectile tumor may be present, which is painless, the skin normal except for the presence of a few enlarged veins. In other cases, cysts may exist due to the presence of degeneration in the tumor. In outline the tumors are usually smooth, sometimes nodular, may fluctuate if cystic, are of slow growth and may bleed if ulceration of the skin occurs. There is a decided tendency toward involvement of the right breast as shown in six of the eight cases reported; in one instance only (Bittner) was a bilateral tumor present.

The treatment of vascular tumors of the breast depends upon their seat and size. Small superficial tumors require no treatment, or may be destroyed by the cautery, as was done in Bryant's case. The larger tumors, situated in the breast proper, require extirpation and in some instances are of such size, that complete removal of the breast may be necessary.

The reported cases of this type are as follows:

1. MALAPERT.[4]—Girl aged 12, developed an enlargement of right breast fifteen days after birth; and at the age of six months a decided enlargement was present. There was no pulsation in the tumor, which did not enlarge on straining and was painless. On palpation a smooth, fluctuating tumor, the size of an orange, was apparent, the skin free,

the mass movable on the underlying structures. Operation: Removal of three cysts and a solid mass, the microscopic examination showing an angioma with some breast-tissue remaining.

2. Bajardi.[1]—Child 2 years of age, tumor of right breast noted six months after birth, later attaining size of an orange. Skin blue around nipple. The tumor was slightly adherent to nipple which was slightly retracted, and on palpation was soft and elastic. It was reducible and was made tense on straining. Operation: Excision of tumor and nipple. Microscopic examination: Angioma with atrophy of breast-tissue.

3. Colzi.[5]—Boy aged 10 had enlarged right breast since early infancy. The tumor grew slowly until the whole gland and nipple were involved. The microscopic examination of the tissues removed showed an angioma and pressure atrophy of the breast.

4. Althorp.[4]—Boy aged 7, tumor in right breast since birth, very slow in development until the subject of trauma when it increased rapidly. The skin became discolored; the superficial vessels enlarged. The tumor was lobulated, movable, and fluctuating. Operation: Excision of cystic tumor containing 30 oz. fluid. Microscopically the mass consisted of angiomatous and muscular tissues.

5. Williams.[6]—Boy aged 7, developed a tumor in right breast, outside and below nipple, which was not involved. The growth was of five months' duration, about the size of a half crown, and firmly adherent to the breast. Diagnosis: Degenerated angioma. Operation: Removal of breast.

6. Bryant.[7]—Girl aged 15 weeks; tumor involved whole breast and skin, nipple retracted. The tumor measured two inches in diameter, was spongy and prominent, covered by large veins. The whole swelling could be reduced by pressure. No treatment was instituted.

BENIGN TUMORS OTHER THAN THOSE OF VASCULAR ORIGIN.

As in the adult breast we encounter a variety of benign tumors of this type in the mammary gland in children. In describing these types they may be grouped clinically as benign, as the symptoms they produce are fairly constant. In most of the cases the tumors consist of a hypertrophy of both fibrous and epithelial elements, giving the usual appearance of fibro-epithelial growths as seen in the adult, and can be classified, therefore, as fibro-adenomata. A few instances of cystic disease of the breast and of lipoma in children are on record.

The two cases which follow were observed by us and are reported for the first time:

I. F. W., female, aged 10 years, was first seen in January, 1907, in the Surgical Dispensary of the University Hospital. The child was poorly nourished and slightly anæmic. She complained of pain and tenderness in the left breast, particularly in the region of the nipple. There had been no traumatism suggestive of a cause of the pain. On examination the breasts were found to be in an undeveloped state, although the left one was slightly larger. Palpation caused some pain, and revealed a slight thickening of the tissue beneath the skin; local measures were instituted and the mother advised to have the child return if she noticed any subsequent enlargement of the breast. The condition remained unchanged for ten months when there was a decided increase in the size of the breast, which became more painful especially if handled. When examined one year after the first visit and two months after this decided enlargement, a small mass the size of an almond could be readily palpated. It presented the usual symptoms of a small adenofibromatous growth, being freely movable, and the overlying skin not affected. Enlarged axillary nodes or dilated veins were not present. Because the tumor was in intimate relationship with the nipple, the possible danger of atrophy of the breast following removal of the growth was considered and explained, and operation advised in view of the possible malignancy due to the sudden increase in size. The operation was performed by Dr. John Speese. The rudimentary gland was exposed by an incision 1½ inches in length at its base; and the tumor removed. It was encapsulated, slightly adherent to the portion of the gland beneath the nipple, so that in its removal it was impossible to avoid some injury to the ducts; it was easily stripped from the pectoral fascia. The incision was closed by a few interrupted sutures and the wound healed rapidly with practically no scar. *Microscopically,* the tumor consisted of a fibro-epithelial formation showing a typical adenofibromatous growth (see Fig. 1). The glandular part consisted of a few acini, the greater portion being derived from the ducts, which were lined with cuboidal epithelium.

II. Addie P., colored, aged 11. Admitted to the Children's Hospital, April 23, 1907. Service of Dr. J. H. Jopson. An only child. Both parents living and well. No history of specific or malignant disease. No illness except measles and pertussis. Has never menstruated. Enlargement of right breast, stated to have been noted first by the child some eight weeks before. Mother has observed it for four weeks, during which time it has rapidly increased in size. Occasional sharp pains in breast for several weeks. No other symptoms complained of.

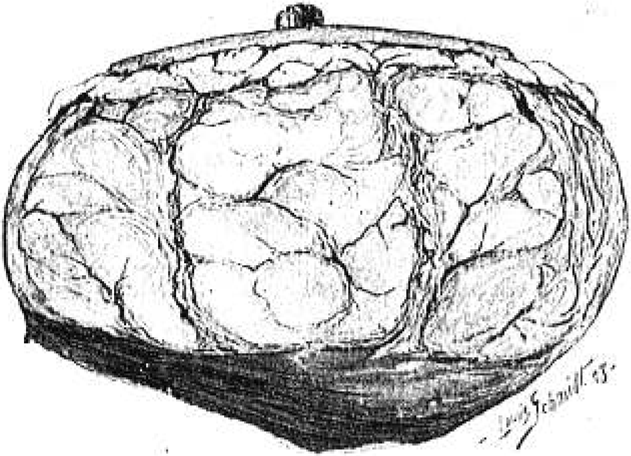
Physical Examination.—Patient is well developed for her age. General nutrition good. Examination of heart and lungs negative. Abdominal examination, negative. The right breast is enlarged, globular in shape, nearly three times the size of left. It is very hard. The skin is tense and shiny. Numerous large subcutaneous veins radiating from nipple. The nipple is flattened and partially retracted. No special tenderness. Breast is very movable on underlying tissues. One or two small glands are palpable in the axilla. (See Fig. 2.) *Diagnosis.*—Sarcoma.

Operation.—April 26, 1907, amputation of breast. Elliptical incision, greater part of skin covering breast sacrificed with it. Great vascularity of subcutaneous tissue. Pectoral fascia was cleaned from muscle, which was not removed. Thorough dissection of the axilla from below. Several enlarged glands were found. Their appearance suggestive of sarcomatous infiltration. Undermining of skin edges was necessary to closure of wound, which was accomplished except for a central area about the size of a silver dollar. Primary healing of wound. Patient discharged from hospital June 13, 1908.

Laboratory Report.—The tumor when received measured about 6½ x 4¼ x 3¼". The overlying skin including the nipple was intact and freely movable on the tumor. The nipple showed marked retraction. The tumor mass of an irregularly moulded shape, its consistency firm throughout and of marked density. Section of the tumor showed it to be composed entirely of pale whitish glistening tissue, poorly supplied with blood. On section the tissue was arranged in rounded masses composed of whorls of glistening white striations; this appearance was continuous throughout all portions of the tumor (Fig. 3).

Histological Examination.—Blocks of tissue for examination were taken from various portions of the tumor mass, those from the surface showing a distinct fibrous capsule consisting, for the most part, of typical old connective tissue fibres. Directly beneath this capsule the tumor was made up of elongated spindle shaped cells closely packed together and arranged in whorls (Fig. 4). These cells were of the fibrous tissue type and characteristic in arrangement and number of the cells found in rapidly growing tumors composed of fibrous tissue. Numerous ducts were seen throughout the tumor, which were lined by cells of a cylindrical type, arranged in some places in one layer, and in others, in several layers. Some of the ducts showed an enlarged lumen re-

Fig. 3.



Case II.—A section of the breast and tumor, showing the diffuse nature of the growth.

sembling cystic formation, and in such localities the epithelial lining was flattened and atrophic from pressure. In no place had the epithelium broken through the basement membrane or infiltrated the surrounding tissues. The breast tissue had practically disappeared except for the presence of these ducts scattered through the tumor; and its place and bulk were represented by the new-formed fibrous tissue.

Pathological Diagnosis.—Diffuse Fibroma. Histological examination of several small lymphatic glands showed moderate congestion and no evidence of tumor metastasis.

We have collected from the literature thirteen cases of this type, abstracts of which follow.

WEINOKOUROFF.[8]—Girl 13½ years of age. Left breast noticed to be enlarged fifteen months before, but not painful. Growth stationary for ten months, when it rapidly increased until three times the size of opposite gland, no pain. Tumor occupied entire left breast, hard, size of two fists, movable. Removal of breast; cured; Diagnosis: adenofibroma.

PATTERSON.[11]—Girl, 13 years, tumor developed seven months after injury; slow growth, no pain or tenderness, not adherent, almond sized, lobulated. Tumor removed; Diagnosis: adenofibroma.

PATTERSON.[11]—Girl aged 12 years, noted a lump in right breast three months ago; painless. Apparently disappeared, but reappeared in one month, causing pain, and gradually growing until it was size and shape of a fig. Growth situated below nipple and not adherent, but tender and sensitive. Operation: Removal of tumor. Diagnosis: adenofibroma.

BARTON.[11]—Girl aged 12, swelling of left breast, when first noticed was size of pigeon's egg, and painless. In two months' time was four times size of opposite breast, covered by dilated veins, lobulated, freely movable, nipple and glands normal. Operation: Removal of breast. Diagnosis: adenofibroma.

CARTLEDGE.[11]—Girl aged 16 years, right breast seat of a tumor, situated midway between nipple and axilla. Rapid in growth, painful, superficial veins enlarged. Tumor movable, size of goose egg, not adherent to gland. Operation: Entire breast removed, probably fibroma.

HOPKINS.[10]—Girl aged 11, four years previously had tumor, size chestnut, removed from right breast. Six months after operation left breast enlarged; later very rapid growth and enlargement of axillary nodes. Never menstruated. Entire breast and four nodes removed. Diagnosis: Fibroma. First tumor probably same type.

LEDOUBLE.[11]—Girl aged 15, rapid increase in size of both breasts following cessation of menstruation. Nipple flattened, overlying skin tense and containing large veins, pain of lancinating character, discomfort from weight of breasts. Diagnosis: Hypertrophy; under palliative treatment there was a diminution of left breast, right one increased in size and finally was amputated, weight being 1985 Gm. Microscopical examination: fibro-adenoma, preponderance of fibrous tissue.

GUENIOT.[7]—Observed case in a girl of 14 years, breast three times its normal volume, lancinating pains and enlarged nodes of the axilla were palpable. Diagnosis: not given.

HAYNES.[9]—Girl aged 13, developed an enlargement of both breasts about nine months before. There was slight pain on pressure, which symptom soon disappeared. Five months after the enlargement began, the left breast grew very rapidly. An examination showed that the breast extended to the ilium when the patient was standing. The nipple was flattened and the region about excoriated. The breast was freely movable on the deeper structures but was not painful and only inconvenient by reason of its weight and size. The axillary glands were not enlarged. The breast when amputated weighed exactly eight pounds, and was reported as a fibroadenoma undergoing mucoid degeneration.

PARSONS.[10]—Child 3 years of age, enlargement of left breast noted eighteen months previously, slow growth, no pain or discharge from nipple. Mass was size of an egg, cystic in character, adherent to skin, nipple normal. No tenderness or enlarged nodes. Removal of tumor and part of pectoral fascia. Diagnosis: Cyst, containing clear fluid within and a smooth wall.

SPENCER.[15]—Boy aged 4, lump in right breast since birth, round, tense, size of pea, painless. Rapid increase in size during the last three weeks, when it became size of egg, skin normal, no discharge from nipple, no nodes palpable. Exploratory puncture gave bloody fluid. Breast amputated. Was seat of multiple cysts and a solid growth, size of hazel nut. Probably cystic fibroma.

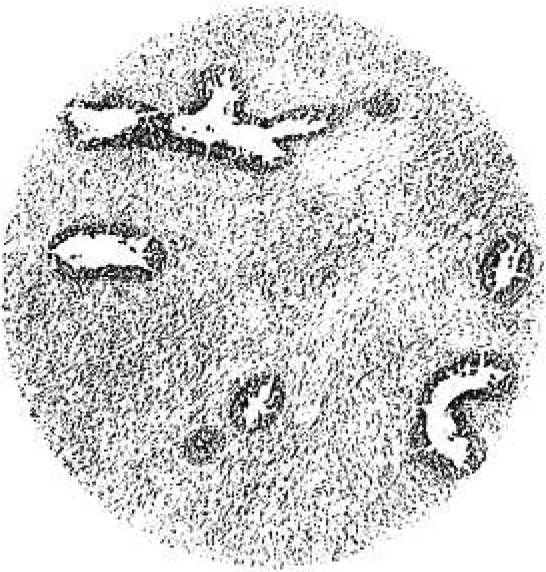
ATKINS.[14]—Records an enormous lipoma, 25 pounds, in girl of 16 years. At the age of 4 years parents noticed a slight enlargement of left breast, which increased slowly and without pain until she was 12 years old. Then tumor began to enlarge very rapidly. Right breast was normal. Catamenia have not appeared. Growth removed. Operation followed by cure. Diagnosis: lipoma.

BRYANT.[18]—Male, aged 10 months. Hard tumor size of walnut situated above and to outer side of left nipple, moving freely upon the deeper parts, skin adherent but not discolored. Four months before began to grow rapidly. Composed of fatty and fibrous tissue.

We have carefully analyzed these 21 cases of benign tumors of the breast in so far as the data, often scanty in the original reports would permit. We have made the usual age limit of 16 years. In only one of the cases in the older girls, was menstruation mentioned as having occurred, and in several others it was stated that it had not occurred.

First with reference to the type of tumor and its relative frequency. Eleven of the 21 cases can be classified as fibromata or fibro-adenomata. The dividing line between these

FIG. 4.



Histological structure of the tumor in Case II. It is made up for the most part of elongated spindle-shaped cells arranged in whorls.

two types of tumor if it exists at all, is a very indefinite one and we are inclined to follow the classification of Ribbert as adopted by Warren, Rodman and other writers on this subject, and consider them as fibro-adenomata. They constitute the most numerous of any type of tumor of the breast occurring in childhood, and their proportion to the total number of benign breast tumors is higher in children than in adults. There were six angiomata, one fibro-lipoma, one lipoma, and one simple cyst; in one case the diagnosis was not given. Fourteen of the cases were in females, five in males and in two the sex was not stated; these were probably females. In three of the six cases of angioma the tumor was in boys. In this as in other respects, angiomata are practically in a class by themselves as regards their occurrence, pathology and symptomatology.

Age.—Most of the angiomata were noted at birth or soon afterward; the children, however, were often half-grown before being brought for surgical attention. The oldest was 12 years and the youngest 15 weeks. Of the other tumors, with three exceptions, the cases were 10 years old and upward. These three cases were aged 10 months, three and four years respectively; the other cases ranged between 10 and 16 years. One was 10, two were 11, two 12, three 13, one 14, one 15 and two 16 years.

The *duration* ranged from two months to 12 years. In some cases the growth were distinctly rapid from the start, but not infrequently they were of gradual development or showed a rapid increase after a long stationary period.

As already stated the angiomata were commonly congenital or appeared in infancy.

As to *causation,* in one case there was a history of traumatism before the appearance of the tumor, and in another case, an angioma, there was rapid increase in the size of a congenital tumor following injury.

Breast involved.—In 9 cases the right breast was the seat of tumor, in 7 the left breast was affected, in two both breasts, and in three the location was not stated.

Location of the tumor in the breast.—But little data was furnished in this respect. The growth was stated to be below the nipple in two cases, and twice in the outer quadrant.

In some cases the entire breast was involved, while in others the tumor was of a localized nature, and it was difficult from many of the case reports to state to which of these two classes the case should be assigned. In at least nine cases practically the entire breast was involved. *Size.*—The largest tumor (Atkins[14]) was a lipoma which weighed 25 pounds. In Le Double's[13] case the tumor weighed between 4 and 5 pounds (a fibro-adenoma), and in Haynes[8] case (a fibro-adenoma undergoing mucoid degeneration), it weighed 8 pounds. Several times the tumor was said to be 3 or 4 times the size of the opposite breast. The smallest growths were the size of a walnut, almond or egg and were seen to be of a localized nature.

In practically every instance the tumor, or if the whole breast was involved, the breast was said to be movable. In two of these cases the skin was not adherent.

Nipple.—The nipple was retracted in several cases, flattened in two and said to be normal in one. The skin is usually normal except for the presence of dilated veins which are not uncommon. Dilated veins were described as being present in five cases, two of which were angiomata. In our own case, in addition to this enlargement of the veins, the skin was tense and shining; in one case of angioma it was said to be discolored.

Pain and Tenderness.—In six cases pain or tenderness or both were mentioned as being present, sometimes sharp and lancinating. In four cases pain was said to be absent, and in the remaining instances it was not mentioned.

Lymph Nodes.—These were enlarged in 3 cases, not enlarged in 5 cases, and not mentioned in the remainder.

Operation.—In 11 cases the entire breast was removed, and in two the axilla dissected free of enlarged lymph nodes. In 8 cases the tumor was excised, once including the nipple. In one case no treatment was instituted and in one it was not mentioned.

Result.—So far as known all the cases operated upon were cured.

MALIGNANT TUMORS. CARCINOMA AND SARCOMA.

The number of malignant tumors of the breast which have been observed in childhood is small. This is what might be expected in the case of carcinoma the rarity of which is well known in childhood. It is doubtful if any well authenticated case of carcinoma of the breast under sixteen years of age has been reported and Gross states that it does not occur under the age of 20 years.

P. W. Phillip[28] in his article "Ueber Krebsbildungen in Kindersalter," collects 390 cases of cancer reported as occurring in childhood. Of this number only 87 (22.3 per cent.) withstood critical examination as to their nature, the remainder being doubtful cases. This is sufficient to show the rarity of cancers in childhood. Phillip did not find a case of mammary carcinoma under 15 years, and only one case of cancer of the uterus, while 26 cases of ovarian cancer were observed. There seems to be a relative predisposition of the ovaries to malignant disease in childhood, furnishing 20 per cent. of all cases of cancer, while in adult life they furnish but 5 per cent. at the highest estimate. We have found but three cancers of the breast in children, and all of these cases are doubtful in nature, and reported many years ago. They are as follows:

1. LYFORD.[19]—A case in a girl of 8 years. (Mentioned in John Birkett's article, "Diseases of the Breast," in Holmes' System of Surgery, vol. iii.)
2. B. B. COOPER.[20]—Lectures on Surgery, 1851, reports a case which he thought to be cancer in a girl of 13 years. The tumor was rapid in its development, painless, and accompanied by cachexia and metastasis to the thoracic and abdominal viscera. (This may have been and probably was a case of sarcoma.)
3. BIRKETT.[21]—Mentions a specimen in the Museum of St. Bartholomew's Hospital, removed from a girl of 16 years.

SARCOMA.

This also is a rare disease of the breast in children. While a number of references are contained in the literature, very meagre descriptions of the histological structure of the supposed sarcomata are furnished. Gross[20] states that 1.66 per cent. of cases of sarcoma of the breast occur during the developmental stage, that is, before the sixteenth year. Karewski[31] collected 156 cases of sarcoma of the breast of which 1 occurred before the tenth year and 14 before the eighteenth year of life. There is no doubt that sarcoma is a much rarer tumor of the breast than was supposed by the older writers, a fact recently emphasized by Rodman[30] in his work on "Diseases of the Breast." Instead of 5 to 9 per cent. of mammary tumors he estimates its frequency from an analysis of 5000 cases at 2.78 per cent. The relative liability of the female breast to sarcoma is below that of the body in general and while, heretofore, it has been generally assumed and stated that it was a disease of young women, it is a fact, as Rodman points out, that one-half of the cases occur between the ages of 40 and 50 years. Two explanations may be furnished to reconcile the disparity between the figures of the older writers, as Gross, and those of the present day. The commonly accepted one is that a more accurate histologic diagnosis is now insisted upon and that the microscope is relied upon more than the clinical picture. Another explanation which has occurred to us is, that the great increase in recent years in the number of cases of cancer of the breast, as of cases of cancers of all kinds, has not been accompanied by a relative increase in the number of cases of sarcoma of the breast.

Types of Sarcoma Found in Childhood.—Generally speaking, spindle-cell tumors develop at an earlier age than do round-cell tumors, while cystic sarcomas are observed more frequently in youth. It may be difficult to diagnose between a rapidly growing fibroma and a spindle-cell sarcoma. Thus in our second case diagnosed before operation as sarcoma, several experienced pathologists made a diagnosis of sarcoma, from some of the microscopic preparations which apparently confirmed the clinical diagnosis. The liability to error before operation is not inconsiderable, for our second case presented the clinical picture of a rapidly growing sarcoma, the diagnosis being based upon the rapid growth of the tumor, its general appearance and the presence of the distended veins in the overlying skin, an appearance which is common to sarcomata in general. A review of the cases here collected will show, however, that this latter symptom is described as present in a number of cases of non-malignant tumors of the breast in childhood both of angiomatous and fibro-epithelial origin. The following are the references to sarcoma of the breast. Scant details are furnished in the original reports.

1. SHEILD.[22]—A rapidly growing spindle-cell sarcoma in girl of 14 years.

2. SHEILD.[23]—A myxo-sarcoma removed from the breast of an infant aged six months.

3. CHAMBERS.[27]—A four months old child presented a small round-cell sarcoma of the breast the size of an egg. Duration, since 5 weeks. Removed. No recurrence at the age of five months.

4. BILLROTH.[25]—A child of 9 months. Sarcoma of breast. Removal.

5. HANSEY.[26]—A case seen at an early age.

6. RODMAN.[24]—A girl aged 11 years gave a history of traumatism one year before development of the tumor. Pain in breast was followed by an increase in size, the growth being fairly hard. Removal was advised on account of increased pain, and the presence of enlarged veins in the overlying skin; which the author believed indicated the tumor to be of sarcomatous type. Breast was removed. No enlarged glands were found in the axilla. Microscopic examination not made, specimen being lost.

The diagnosis was based on what may have been misleading clinical symptoms. The presence of the enlarged veins is not conclusive evidence of malignancy as shown in our own case and in several of the vascular and fibro-epithelial tumors which have been collected in this series.

CONCLUSIONS.

Tumors of the Breast.—While rare in childhood, occur in both sexes and at all ages.

The benign tumors are more frequently encountered in the mammary gland in early life than the malignant tumors. The fibro-epithelial growths are the most numerous group of the benign tumors, and next to these in point of frequency come the angiomata.

Sarcoma may occur in children in the mammary gland, but it is a rare tumor. The breast enjoys almost complete immunity to carcinoma before the age of puberty.

Girls are affected more frequently than boys, but the disparity in numbers is immensely less than in adults.

The angiomata are commonly congenital, or first appear in infancy. The fibro-adenomata tend to develop more frequently as the child approaches puberty.

Some of the smaller benign tumors occasion no inconvenience. Others are associated with symptoms, pain, tenderness, and inconvenience or discomfort from excessive weight or size. Sarcomata present the symptoms common to that type of tumor.

Operation is usually indicated in the benign and always in the malignant varieties. In small benign tumors or those involving only limited areas, conservative plastic operations with preservation of breast and nipple are indicated. In a goodly number, however, the breast must be sacrificed. The axilla should be cleaned if it contains enlarged glands. The results of operation are good.

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